CLAIMS

1. A system for providing a signal to an actuator within an optical disk drive, to focus optics on an optical disk within the optical disk drive, wherein the system comprises:
   an error term generator configured to generate an error term;
   an adaptation coefficient configured to regulate a rate at which the error term modifies an actuator control signal; and
   an actuator control signal generator to generate the actuator control signal, wherein the actuator control signal is a function of a prior actuator position, the error term and the adaptation coefficient.

2. The system of claim 1, wherein the error term generator is configured to generate the error term using a FES signal as input.

3. The system of claim 2, wherein the error term generator is configured to sample the FES signal and use an A-to-D converter to produce the error term.

4. The system of claim 1, wherein the error term generator is configured to calculate the error term for every new actuator control signal generated by the actuator control signal generator.

5. The system of claim 1, wherein the actuator control signal generator additionally comprises:
   a coefficient generator to generate coefficients as a function of inputs comprising the adaptation coefficient and the error term; and
   a Fourier subroutine to generate the actuator control signal using the coefficients generated.

6. The system of claim 1, wherein the actuator control signal generator additionally comprises:

a coefficient generator configured to generate coefficients comprising:

A0 = A0 + (DC0 * Ek * Mu);

A1 = A1 + (QS1 * Ek * Mu);

B1 = B1 + (QC1 * Ek * Mu);

A2 = A2 + (QS2 * Ek * Mu);

B2 = B2 + (QC2 * Ek * Mu); and

wherein Ek is the error term and Mu is the adaptation coefficient; and

a Fourier subroutine configured to generate the actuator control signal using the coefficients generated.

7. The system of claim 1, wherein the actuator control signal generator is configured to generate a signal according to Wk(new) = Wk(old) – (Mu * Ek), wherein Ek is the error term and Mu is the adaptation coefficient.

8. The system of claim 7, wherein the actuator signal generator is configured, at disk rpm high enough to result in actuator resonance, to filter Ek values with a digital filter model of an inverse of the actuator frequency response before adapting each Wk.

9. The system of claim 1, wherein the actuator control signal generator is configured, if an angular disk speed of the optical disk drive is sufficiently high, to shift a phase of terms within the actuator control signal to reduce actuator resonance.

10. The system of claim 1, additionally comprising a baseline actuator positioning routine to set a baseline voltage level.

11. The system of claim 1, wherein the baseline voltage level includes an AC component.

12. The system of claim 1, additionally comprising a baseline actuator positioning routine, to establish a baseline signal for application to an actuator, wherein the baseline actuator positioning routine is configured to:

step an actuator through a full range of focus;

record a maximum value of the SUM signal data obtained within the full range of focus; and

set the baseline signal according to an input to the actuator which resulted in close to the maximum value of the SUM signal data.

13. The system of claim 12, wherein the input to the actuator which resulted in close to the maximum value of the SUM signal data is set to approximately 75% of the maximum value.

14. A processor-readable medium comprising processor-executable instructions for focusing optics within an optical disk drive, the processor-executable instructions comprising instructions for:

generating an error term;

regulating a rate at which the error term modifies an actuator control signal using an adaptation coefficient; and

generating an actuator control signal as a function of a prior actuator position, the error term and the adaptation coefficient.

15. The processor-readable medium of claim 14, comprising processor-executable instructions for generating the error term using a FES signal as input.

16. The processor-readable medium of claim 15, comprising processor-executable instructions for sampling the FES signal and using an A-to-D converter to produce the error term.

17. The processor-readable medium of claim 14, comprising processor-executable instructions for calculating the error term for every new actuator control signal generated by the actuator control signal generator.

18. A processor-readable medium as recited in claim 14, wherein generating the actuator control signal comprises instructions for:

generating coefficients as a function of inputs comprising the adaptation coefficient and the error term; and

calculating a Fourier series to generate the actuator control signal using the coefficients generated.

19. A processor-readable medium as recited in claim 14, wherein generating the actuator control signal comprises instructions for:

generating coefficients comprising:

A0 = A0 + (DC0 * Ek * Mu);

A1 = A1 + (QS1 * Ek * Mu);

B1 = B1 + (QC1 * Ek * Mu);

A2 = A2 + (QS2 * Ek * Mu); and

B2 = B2 + (QC2 * Ek * Mu);

wherein Ek is the error term and Mu is the adaptation coefficient; and

calculating a Fourier series to generate the actuator control signal using the coefficients generated.

20. A processor-readable medium as recited in claim 14, wherein generating the actuator control signal comprises instructions for calculating the actuator control signal according to Wk(new) = Wk(old) – (Mu * Ek), wherein Ek is the error term and Mu is the adaptation coefficient.

21. A processor-readable medium as recited in claim 20, wherein generating the actuator control signal comprises instructions for, if an angular disk speed of the optical disk drive is sufficiently high, shifting a phase of terms within the actuator control signal to compensate for actuator harmonics.

22. A processor-readable medium as recited in claim 14, comprising instructions for creating a baseline signal.

23. The processor-readable media of claim 22, additional comprising instructions for creating a baseline signal, wherein the baseline signal is different in different sectors of the disk.

24. A processor-readable medium as recited in claim 14, wherein creating the baseline signal to initially position an actuator comprises instructions for:

step an actuator through a full range of focus;

record a maximum value of the SUM signal data obtained within the full range of focus; and

set the baseline signal according to an input to the actuator which resulted in close to the maximum value of the SUM signal data.

25. A method of focusing optics on a disk within an optical disk drive, comprising:

generating an error term;

regulating a rate at which the error term modifies an actuator control signal using an adaptation coefficient; and

generating an actuator control signal as a function of a prior actuator position, the error term and the adaptation coefficient.

26. The method of claim 25, additionally comprising generating the error term using a FES signal as input.

27. The method of claim 25, additionally comprising sampling the FES signal and using an A-to-D converter to produce the error term.

28. The method of claim 25, additionally comprising calculating the error term for every new actuator control signal generated by the actuator control signal generator.

29. The method of claim 25, wherein generating the actuator control signal comprises:
generating coefficients as a function of inputs comprising the adaptation coefficient and the error term; and
calculating a Fourier series to generate the actuator control signal using the coefficients generated.

30. The method of claim 25 wherein generating the actuator control signal comprises:
generating coefficients comprising:
A0 = A0 + (DC0 * Ek * Mu);
A1 = A1 + (QS1 * Ek * Mu);
B1 = B1 + (QC1 * Ek * Mu);
A2 = A2 + (QS2 * Ek * Mu); and
B2 = B2 + (QC2 * Ek * Mu);
wherein Ek is the error term and Mu is the adaptation coefficient; and
calculating a Fourier series to generate the actuator control signal using the coefficients generated.

31. The method of claim 25, additional comprising creating a baseline signal for initial use as the actuator control signal.

32. The method of claim 25, wherein creating the baseline signal to initially position an actuator comprises:
stepping an actuator through a full range of focus;
recording a maximum value of the SUM signal data obtained within the full range of focus; and
setting the baseline signal according to an input to the actuator which resulted in close to the maximum value of the SUM signal data.

33. The method of claim 25, wherein generating the actuator control signal comprises calculating the actuator control signal according to Wk(new) = Wk(old) – (Mu * Ek), where Mu is the adaptation coefficient and Ek is the error term.

34. The method of claim 25, wherein generating the actuator control signal additionally comprising, if an angular disk speed of the optical disk drive is sufficiently high, shifting a phase of terms within the actuator control signal to compensate for actuator harmonics.

35. A focusing system, comprising:
means for generating an error term;
means for regulating a rate at which the error term modifies an actuator control signal using an adaptation coefficient; and
means for generating an actuator control signal as a function of a prior actuator position, the error term and the adaptation coefficient.

36. The focusing system of claim 35, additionally comprising means for generating the error term using a FES signal as input.

37. The focusing system of claim 35, additionally comprising means for sampling the FES signal and using an A-to-D converter to produce the error term.

38. The focusing system of claim 35, additionally comprising means for calculating the error term for every new actuator control signal generated by the actuator control signal generator.

39. The focusing system of claim 35, wherein the means for generating the actuator control signal comprises:
means for generating coefficients as a function of inputs comprising the adaptation coefficient and the error term; and
means for calculating a Fourier series to generate the actuator control signal using the coefficients generated.

40. The focusing system of claim 35, wherein the means for generating the actuator control signal comprises:
means for generating coefficients comprising:

A0 = A0 + (DC0 * Ek * Mu);
A1 = A1 + (QS1 * Ek * Mu);
B1 = B1 + (QC1 * Ek * Mu);
A2 = A2 + (QS2 * Ek * Mu); and
B2 = B2 + (QC2 * Ek * Mu);

wherein Ek is the error term and Mu is the adaptation coefficient; and
means for calculating a Fourier series to generate the actuator control signal using the coefficients generated.

41. The focusing system of claim 35, wherein the means for generating the actuator control signal comprises means for calculating the actuator control signal according to Wk(new) = Wk(old) – (Mu * Ek), wherein Ek is the error term and Mu is the adaptation coefficient.

42. The focusing system of claim 41, wherein the means for generating the actuator control signal additionally comprises, if an angular disk speed of the optical disk drive is sufficiently high, means for shifting a phase of terms within the actuator control signal to compensate for actuator harmonics.

43. The focusing system of claim 35, additional comprising means for creating a baseline signal, wherein the baseline signal is different in different sectors of the disk.

44. The focusing system of claim 35, wherein creating the baseline signal to initially position an actuator comprises:

means for stepping the actuator through a full range of focus;

means for recording a maximum value of the SUM signal data obtained within the full range of focus; and

means for setting the baseline signal according to an input to the actuator which resulted in close to the maximum value of the SUM signal data.